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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/525,903	09/06/2005	Junichiro Ichikawa	1716364	9664

7590 04/20/2007
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EXAMINER

ANDERSON, GUY G

ART UNIT	PAPER NUMBER
2883	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/20/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/525,903	ICHIKAWA ET AL.	
	Examiner	Art Unit	
	Guy G. Anderson	2883	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-5,8-11,13,15-18,20 and 23-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-5,8-11,13,15-18,20 and 23-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 February 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

- 1.1 Applicant's arguments filed February 2, 2007 have been fully considered but they are not persuasive.
- 1.2 Regarding the claim rejections in the first office action dated November 3, 2006 under 35 U.S.C. 103 (a), applicants have rejected claims 1, 6-7, 12, 14, 19, 21-22 and amended claims 2-5, 8-11, 13, 15-18, 20 and added new claims 23-27.
- 1.3 Applicant has added a claim limitation to the independent claims 2 and 8 "wherein stray light rejection means for suppressing a photo-refractive phenomenon in the optical waveguides due to interference of light passing through said optical waveguide and stray light."
This limitation is however, a reason why the grooves are placed on the device while the claim itself is for a device. In the case of device claims, the motivations as to why a particular structure is chosen are irrelevant to the patentability of the device. Even the end use of the chosen device is irrelevant to the structure claims themselves.
For purposes of U.S.C. 103 (a), all that is required to reject a device claim is to show that a reference, or combination of references, would teach or disclose to a PHOSITA at the time of invention the structure of the claimed device.
In the instant case, the combination of the Hashimoto and Kato teach or disclose the structure of applicant's claims, namely a substrate with an optical waveguide, further, an MZI waveguide, with grooves placed on the surface to reject stray light.
In the interest of furthering prosecution, examiner notes that the addition of claim limitations to the independent claims relating to the grooves themselves may add to the patentability of the device. These limitations might include the physical dimensions of the grooves, such as depth, width and length of the grooves, as well as the placement of the grooves on the device.
- 1.4 Applicants argue further that another object of the invention is to reject stray light caused by light reflecting from the branching point in the MZI configuration. However, applicant never claims this limitation in the currently presented claims, so for that reason alone, the argument is irrelevant. But this argument also goes to a limitation that is a reason why a

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particular structure is chosen and would therefore be subject to the same argument as used in paragraph 1.3 above.

- 1.5 Applicant also argues that neither the Kato nor the Hashimoto references describe stray light generated by the use of a MZ waveguide or disclose the feature of suppressing a photo-refractive phenomenon.

Kato discloses the use of a MZ waveguide while Hashimoto discloses an optical module that teaches the use of stray light rejection means including light blocking grooves on the cladding and substrate, metal doping in order to change the refractive index properties and thus absorb stray light, and a resin layer coating which provides another layer with a different refractive index in order to absorb stray light, and placing light blocking regions in various areas of the module in order to absorb or scatter light. [Hashimoto at Col. 3-4, Lines 45-67, 1-25, Col. 13-14, Lines 45-67, 1-25, Col. 15-16, Lines 20-67, 1-10, Col. 16, Lines 10-42.]

Examiner relies on In re McLaughlin, 170 USPQ 209, where the court noted that "It should be too well settled now to require citation or discussion that the test for combining references is not what the individual references themselves suggest but rather what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art."

Also see In re Bozek, 163 USPQ 545, where the court noted that

"The test for obviousness is not whether the features of one reference may be bodily incorporated into the other to produce the claimed subject matter but simply what the combination of references makes obvious to one of ordinary skill in the pertinent art."

- 1.6 For these reasons, the rejections are maintained.

Response to Amendment

Claim Rejections - 35 USC § 103

- 2.1 The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

- 2.2 **Claims 2-5, 8-11, 13, 15-18, 20, 23-27 are rejected** under 35 U.S.C. 103(a) as being unpatentable over US-5627920 to Kato et al. in view of US-6480639 to Hashimoto et al.

Regarding Claims 2, 8, Kato specifically discloses an optical modulator comprising/wherein:

2a, 8a,) a substrate comprised of a material having a photorefractive effect, an optical waveguide formed on said substrate, into which light is input by a CW laser, [Kato at Abstract, Fig. 1.]

Kato does not specifically teach an optical modulator comprising/wherein:

2b) wherein stray light rejection means for suppressing a photorefractive phenomenon in the optical waveguide due to interference of light passing through said optical waveguide and stray light is provided on a surface of said substrate, and said stray light rejection means comprises a stray light rejection groove, which is formed on the surface of said substrate, and at least one part of which is formed adjacent to said optical waveguide.

8b) wherein stray light rejection means for suppressing a photorefractive phenomenon in the optical waveguide due to interference of light passing through said optical waveguide and stray light is provided on a surface of said substrate, and said stray light rejection means comprises a low refractive index area with a refractive index lower than that of said substrate is provided such that the low refractive index area surrounds the optical waveguide.

Hashimoto discloses an optical module that teaches the use of stray light rejection means including light blocking grooves on the cladding and substrate, metal doping in order to change the refractive index properties and thus absorb stray light, and a resin layer coating which provides another layer with a different refractive index in order to absorb stray light, and placing light blocking regions in various areas of the module in order to absorb or scatter light. [Hashimoto at Col. 3-4, Lines 45-67, 1-25, Col. 13-14, Lines 45-67, 1-25, Col. 15-16, Lines 20-67, 1-10, Col. 16, Lines 10-42.]

Since Kato and Hashimoto are both from the same field of endeavor, the light rejection means of Hashimoto would have been recognized in the pertinent art of Kato.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the optical modulator of Kato with the light rejection means of Hashimoto in order to block and absorb stray light.

Regarding Claims 3-5, the combination of Kato and Hashimoto discloses all of the limitations of the base claim upon which Claim 3-5 depends.

The combination does not specifically disclose a waveguide element comprising/wherein:

- 3) a distance between said stray light rejection groove and said optical waveguide is 10 to 100 μm at closest.
- 4) depth of said stray light rejection groove is almost the same as or is more than depth of said optical waveguide.
- 5) said stray light rejection groove is filled with a light absorbing material.

However, determining the optimum dimensions or working ranges has been held to require only routine skill in the art. *In re Aller*, 105 USPQ 233.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the optical modulator of Kato with the light rejection means of Hashimoto adjacent to the waveguide and to vary the distances between the grooves and waveguides as well as the depth of the grooves, and to add light absorbing material into the groove in order to better absorb various wavelengths of light.

Regarding Claims 9-11, the combination of Kato and Hashimoto discloses all of the limitations of the base claim upon which Claim 9-11 depends.

The combination does not specifically disclose a waveguide element comprising/wherein:

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9) said low refractive index area has a thickness greater than a depth of said optical waveguide in a thickness direction of the substrate from a surface of said substrate, and a refractive index between a deepest part of said low refractive index area and a reverse face of said substrate is higher than the refractive index of said low refractive index area.

10) said low refractive index area is formed by diffusion of a low refractive index material having a refractive index lower than that of said substrate, over said substrate.

11) said low refractive index area comprises MgO or ZnO as the low refractive index material.

Hashimoto does disclose the use of materials with different refractive indexes as a means to absorb light as indicated above including a low refractive index resin coating. [Hashimoto at Col. 3-4, Lines 45-67, 1-25, Col. 13-14, Lines 45-67, 1-25, Col. 15-16, Lines 20-67, 1-10, Col. 16, Lines 10-42.]

However, determining the optimum dimensions or working ranges has been held to require only routine skill in the art. *In re Aller*, 105 USPQ 233.

Additionally, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select either MgO or ZnO as possible materials as it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Regarding Claims 13, 15, 18, 20, the combination of Kato and Hashimoto discloses all of the limitations of the base claim upon which Claim 13-15 depends.

The combination does not specifically disclose a waveguide element comprising/wherein:

13, 18) antireflection treatment is given on a reverse face or a side face of said substrate.

15, 20) input power of light input into said optical modulator is more than 10mW.

Hashimoto specifically discloses the use of anti-reflection coatings as light blocking layers. [Col. 16, Lines 32-42.] It is also well known in the art that 40 Ghz is a current standard speed that manufactures of modulators must meet in order to have devices that are usable in

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today's telecom market. It is also well known in the art that 10mW and higher are standard power outputs of typical semiconductor lasers used in the art.

Therefore, it would have been obvious to one who of ordinary skill in the art at the time of invention to modify Kato with the light blocking means of Hashimoto while designing a device capable of operating at 40GHz and capable of handling input optical power greater than 10mW.

Regarding Claims 16-17, the combination of Kato and Hashimoto discloses all of the limitations of the base claim upon which Claim 16-17 depends.

The combination does not specifically disclose a waveguide element comprising/wherein:

16) depth of said stray light rejection groove is almost the same as or is more than depth of said optical waveguide.

17) said stray light rejection groove is filled with a light absorbing material.

However, determining the optimum dimensions or working ranges has been held to require only routine skill in the art. *In re Aller*, 105 USPQ 233.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the optical modulator of Kato with the light rejection means of Hashimoto adjacent to the waveguide and to vary the distances between the grooves and waveguides as well as the depth of the grooves, and to add light absorbing material into the groove in order to better absorb various wavelengths of light.

Regarding Claims 23-25, the combination of Kato and Hashimoto discloses all of the limitations of the base claim upon which Claim 23-25 depends.

The combination does not specifically disclose a waveguide element comprising/wherein:

23) at least one part of said stray light rejection means is disposed in such position that stray light from an input end of said optical waveguide element is blocked from entering said optical waveguide.

24) at least one part of said stray light rejection means is disposed in such position that stray light from a branching point of a branching optical waveguide of said optical waveguide element is blocked from entering said optical waveguide.

25) at least one part of said stray light rejection means is disposed in such position that stray light reflecting from a side face of the substrate of said optical waveguide element is blocked from entering said optical waveguide.

Hashimoto discloses an optical module that teaches the use of stray light rejection means including light blocking grooves on the cladding and substrate, metal doping in order to change the refractive index properties and thus absorb stray light, and a resin layer coating which provides another layer with a different refractive index in order to absorb stray light, and placing light blocking regions in various areas of the module in order to absorb or scatter light. [Hashimoto at Col. 3-4, Lines 45-67, 1-25, Col. 13-14, Lines 45-67, 1-25, Col. 15-16, Lines 20-67, 1-10, Col. 16, Lines 10-42.]

Kato discloses an MZI modulator designed to have light from a CW laser input into the waveguide.

It would have been obvious to one of ordinary skill in the art at the time of invention to place the stray light rejection means at various positions in order to block light from entering the waveguide.

Regarding claims 26-27, the combination of Kato and Hashimoto discloses all of the limitations of the base claim upon which Claim 23-25 depends.

The Kato specifically discloses a waveguide element comprising/wherein:

26, 27) the optical waveguide comprises a branching point. [Kato, Fig. 1.]

Conclusion

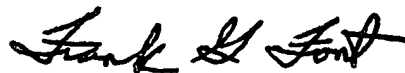
- 3.1 **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).
- 3.2 A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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- 3.3 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Guy G. Anderson whose telephone number is 571.272.8045. The examiner can normally be reached on Tuesday-Saturday 0900-2200.
- 3.4 If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on 571.272.2415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.
- 3.5 Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.
- 3.6 Date and signature of assistant examiner.



9 APR 12 2007



Frank G. Font
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